
Suisun Marsh Monitoring Program Channel Water Salinity Report

Reporting Period: February 2004

Questions regarding this report should be directed to:

Ken Minn

California Department of Water Resources
Division of Environmental Services
3251 S Street
Sacramento, CA 95816-7017

Telephone: (916) 227-7520
kminn@water.ca.gov

1. SUISUN MARSH MONITORING STATIONS AND REPORTING REQUIREMENT

As per SWRCB Water Rights Decision 1641, dated December 29, 1999, and previous SWRCB decisions, the California Department of Water Resources (DWR) is required to provide monthly channel water salinity compliance reports for the Suisun Marsh to the SWRCB. The monthly reports summarizing channel water salinity conditions are submitted for October through May of the following calendar year in accordance with SWRCB requirements. Conditions of channel water salinity in the Suisun Marsh are determined by specific electrical conductivity and specific electrical conductivity is referred to in the reports as "specific conductance". The locations of all listed stations are shown in Figure 5.

This report is required to include salinity data from the stations listed below:

Station Identification	Station Name	General Location	Classification
C-2*	Collinsville	Western Delta	Compliance Station
S-64	National Steel	Eastern Suisun Marsh	Compliance Station
S-49	Beldon's Landing	Northern Suisun Marsh	Compliance Station
S-42	Volanti	North-Western Suisun Marsh	Compliance Station
S-21	Sunrise	North-Western Suisun Marsh	Compliance Station

In addition, data from the stations listed below are also included in the monthly reports to provide information on salinity conditions in the western Suisun Marsh.

Station Identification	Station Name	General Location	Classification
S-97	Ibis	Western Suisun Marsh	Monitoring Station
S-35	Morrow Island	South-Western Suisun Marsh	Monitoring Station

Information on Delta outflow, area precipitation, and operation of the Suisun Marsh Salinity Control Gates are also included in the monthly reports to provide information on conditions that may affect channel water salinity in the Marsh.

* Throughout the report, the representative data from nearby USBR station is used in lieu of data from station C-2.

2. Monitoring Results

2.1 Channel Water Salinity Compliance

During the month of February, 2004, salinity conditions at all five compliance stations were in compliance with channel water salinity standards of SWRCB (Table 1). Compliance with standards for the month of February was determined for each compliance station by comparing the progressive daily mean of high-tide specific conductance (SC) with respective standards. The standard for the eastern and western compliance stations was 8.0 mS/cm during February 2004. Table 1 lists monthly mean high-tide SC at these compliance stations. The progressive daily mean (PDM) is the monthly average of both daily high-tide SC values. The mathematical equation is as shown below.

$$\text{PDM} = \frac{\sum \text{daily average of high tide SC}}{\# \text{ days of the month}}$$

2.2 Delta Outflow

Most of the high runoffs occurred in the second half of February. Delta outflow for this month varied from 12,600 cfs to 160,000 cfs as shown in Figure 3. February outflow started off around 17,000 cfs and had the first peak of 36,000 cfs on February 7, 2004. Thereafter, outflow decline to a low of 12,600 cfs on February 16, 2004 due to lack of significant precipitation during this period. However, in the following day, outflow begin to increase and continues to rise to a high of 160,000 cfs on February 22 as a result of heavy precipitation. For the remainder of the month, outflow fluctuates above 120,000 cfs.

The monthly Delta outflow is represented by the mean Net Delta Outflow Index (NDOI). The NDOI is the estimated daily average of Delta outflow. Mean NDOI for February is listed below:

Month	Mean NDOI (cubic feet per second)
February	61,804

2.3 Rainfall

Total monthly rainfall at the Waterman Gauging Station in Fairfield during February 2004 is listed below:

Month	Total Rainfall (inches)
February	7.08

2.4 Suisun Marsh Salinity Control Gate (SMSCG) Operations

Operations and flashboard/boat lock configuration at the SMSCG for the past 3 months and during February 2004 are summarized below.

Date	Gate status	Flashboards status	Boat Lock status
February 1 - 29	3 gates open	Installed	Closed

The salinity control gates were not necessary to operate and continued to remain open during February because of low salinity levels throughout the marsh. This is expected to be the case in the coming months unless water quality condition changes and warrants re-operation of the gates.

3. Discussion

3.1 Factors Affecting Channel Water Salinity in the Suisun Marsh

Factors that affect channel water salinity levels in the Suisun Marsh include:

- delta outflow;
- tidal exchange;
- rainfall and local creek inflow;
- managed wetland operations; and,
- operation of the SMSCG and flashboard configurations.

3.2 Observations and Trends

3.2.1 Conditions during the Reporting Period

Low salinity conditions of January carried on at the start of February. Despite continued high outflows in February, salinity levels at all compliance station did not further reduce. Salinity levels at Collinsville and National Steel were stable throughout February. However, salinity levels at Sunrise, Beldons, and Volanti were stable for most of February, but decreased slightly at the last week of February in response to the largest outflow that occurred on February 22. Salinity levels at all compliance stations varied between 0.0 mS/cm and 4.0 mS/cm as shown in Figure 1. At the two monitoring stations(S-97 and S-35) salinity levels ranged from 4.0 mS/cm and 6.0 mS/cm as shown in Figure 2. S97 salinity patterns fluctuated more than S35 due to creek flows. This is evident on February 5 and 17, where salinity decline coincides with high creek runoffs and the timeframe of the two largest precipitation events in February. Salinity levels at compliance and monitoring sites were below 4.0 mS/cm and 6.0 mS/cm, respectively, throughout February.

Channel water salinity conditions in the marsh were observed to be influenced by high outflows and creek runoffs in February 2004.

3.2.2 Comparison of Reporting Period Conditions with Previous Years

Monthly mean high-tide SC at the compliance and monitoring stations for February 2004 were compared with means for those months during the previous nine years (Figure 4).

Means salinity pattern of all compliance and monitoring stations were similar to that of February 2003, but with slightly lower magnitude and S21 being lower than S42 for the month. Comparing to the previous nine years, the following observations are made for each of the stations salinity levels for February 2004:

- C-2 salinity level was similar to that of 2003 and third highest
- S64 salinity level was similar to that of 2003 and fourth highest
- S49 salinity level was similar to that of 2003 and third highest
- S42 was similar to that of 2003, and was third highest
- S21 was the fourth highest
- S97 was the fourth highest
- S35 was the fourth highest

Overall, February 2004 salinity levels were ranked fourth in past 9 years in terms of high Specific Conductance.

Table 1**Monthly Mean High Tide Specific Conductance at Suisun Marsh
Water Quality Compliance Stations****February 2004**

Station	Specific Conductance (mS/cm)*	Standard	Standard meet?
C-2**	0.3	8.0	Yes
S-64	1.0	8.0	Yes
S-49	2.8	8.0	Yes
S-42	3.3***	8.0	Yes
S-21	2.1	8.0	Yes

*milliSiemens per centimeter

**The representative data from nearby USBR station is used in lieu of data from station C-2.

***This value was calculated based on available data from February 1 through 23, 2004. The remaining data series from February 24 through 29, 2004 was not available due to equipment failure.

TABLE OF CONTENT

1. SUISUN MARSH MONITORING STATIONS AND REPORTING REQUIREMENT	1
2. MONITORING RESULTS.....	2
2.1 CHANNEL WATER SALINITY COMPLIANCE	2
2.2 DELTA OUTFLOW	2
2.3 RAINFALL	3
2.4 SUISUN MARSH SALINITY CONTROL GATE (SMSCG) OPERATIONS	3
3. DISCUSSION.....	3
3.1 FACTORS AFFECTING CHANNEL WATER SALINITY IN THE SUISUN MARSH	3
3.2 OBSERVATIONS AND TRENDS.....	4
3.2.1 <i>Conditions during the Reporting Period</i>	4
3.2.2 <i>Comparison of Reporting Period Conditions with Previous Years</i>	4

1. SUISUN MARSH MONITORING STATIONS AND REPORTING REQUIREMENT

As per SWRCB Water Rights Decision 1641, dated December 29, 1999, and previous SWRCB decisions, the California Department of Water Resources (DWR) is required to provide monthly channel water salinity compliance reports for the Suisun Marsh to the SWRCB. The monthly reports summarizing channel water salinity conditions are submitted for October through May of the following calendar year in accordance with SWRCB requirements. Conditions of channel water salinity in the Suisun Marsh are determined by specific electrical conductivity and specific electrical conductivity is referred to in the reports as "specific conductance". The locations of all listed stations are shown in Figure 5.

This report is required to include salinity data from the stations listed below:

Station Identification	Station Name	General Location	Classification
C-2*	Collinsville	Western Delta	Compliance Station
S-64	National Steel	Eastern Suisun Marsh	Compliance Station
S-49	Beldon's Landing	Northern Suisun Marsh	Compliance Station
S-42	Volanti	North-Western Suisun Marsh	Compliance Station
S-21	Sunrise	North-Western Suisun Marsh	Compliance Station

In addition, data from the stations listed below are also included in the monthly reports to provide information on salinity conditions in the western Suisun Marsh.

Station Identification	Station Name	General Location	Classification
S-97	Ibis	Western Suisun Marsh	Monitoring Station
S-35	Morrow Island	South-Western Suisun Marsh	Monitoring Station

Information on Delta outflow, area precipitation, and operation of the Suisun Marsh Salinity Control Gates are also included in the monthly reports to provide information on conditions that may affect channel water salinity in the Marsh.

* Throughout the report, the representative data from nearby USBR station is used in lieu of data from station C-2.

2. Monitoring Results

2.1 Channel Water Salinity Compliance

During the month of February, 2004, salinity conditions at all five compliance stations were in compliance with channel water salinity standards of SWRCB (Table 1). Compliance with standards for the month of February was determined for each compliance station by comparing the progressive daily mean of high-tide specific conductance (SC) with respective standards. The standard for the eastern and western compliance stations was 8.0 mS/cm during February 2004. Table 1 lists monthly mean high-tide SC at these compliance stations. The progressive daily mean (PDM) is the monthly average of both daily high-tide SC values. The mathematical equation is as shown below.

$$\text{PDM} = \frac{\sum \text{daily average of high tide SC}}{\# \text{ days of the month}}$$

2.2 Delta Outflow

Most of the high runoffs occurred in the second half of February. Delta outflow for this month varied from 12,600 cfs to 160,000 cfs as shown in Figure 3. February outflow started off around 17,000 cfs and had the first peak of 36,000 cfs on February 7, 2004. Thereafter, outflow decline to a low of 12,600 cfs on February 16, 2004 due to lack of significant precipitation during this period. However, in the following day, outflow begin to increase and continues to rise to a high of 160,000 cfs on February 22 as a result of heavy precipitation. For the remainder of the month, outflow fluctuates above 120,000 cfs.

The monthly Delta outflow is represented by the mean Net Delta Outflow Index (NDOI). The NDOI is the estimated daily average of Delta outflow. Mean NDOI for February is listed below:

Month	Mean NDOI (cubic feet per second)
February	61,804

2.3 Rainfall

Total monthly rainfall at the Waterman Gauging Station in Fairfield during February 2004 is listed below:

Month	Total Rainfall (inches)
February	7.08

2.4 Suisun Marsh Salinity Control Gate (SMSCG) Operations

Operations and flashboard/boat lock configuration at the SMSCG for the past 3 months and during February 2004 are summarized below.

Date	Gate status	Flashboards status	Boat Lock status
February 1 - 29	3 gates open	Installed	Closed

The salinity control gates were not necessary to operate and continued to remain open during February because of low salinity levels throughout the marsh. This is expected to be the case in the coming months unless water quality condition changes and warrants re-operation of the gates.

3. Discussion

3.1 Factors Affecting Channel Water Salinity in the Suisun Marsh

Factors that affect channel water salinity levels in the Suisun Marsh include:

- delta outflow;
- tidal exchange;
- rainfall and local creek inflow;
- managed wetland operations; and,
- operation of the SMSCG and flashboard configurations.

3.2 Observations and Trends

3.2.1 Conditions during the Reporting Period

Low salinity conditions of January carried on at the start of February. Despite continued high outflows in February, salinity levels at all compliance station did not further reduce. Salinity levels at Collinsville and National Steel were stable throughout February. However, salinity levels at Sunrise, Beldons, and Volanti were stable for most of February, but decreased slightly at the last week of February in response to the largest outflow that occurred on February 22. Salinity levels at all compliance stations varied between 0.0 mS/cm and 4.0 mS/cm as shown in Figure 1. At the two monitoring stations(S-97 and S-35) salinity levels ranged from 4.0 mS/cm and 6.0 mS/cm as shown in Figure 2. S97 salinity patterns fluctuated more than S35 due to creek flows. This is evident on February 5 and 17, where salinity decline coincides with high creek runoffs and the timeframe of the two largest precipitation events in February. Salinity levels at compliance and monitoring sites were below 4.0 mS/cm and 6.0 mS/cm, respectively, throughout February.

Channel water salinity conditions in the marsh were observed to be influenced by high outflows and creek runoffs in February 2004.

3.2.2 Comparison of Reporting Period Conditions with Previous Years

Monthly mean high-tide SC at the compliance and monitoring stations for February 2004 were compared with means for those months during the previous nine years (Figure 4).

Means salinity pattern of all compliance and monitoring stations were similar to that of February 2003, but with slightly lower magnitude and S21 being lower than S42 for the month. Comparing to the previous nine years, the following observations are made for each of the stations salinity levels for February 2004:

- C-2 salinity level was similar to that of 2003 and third highest
- S64 salinity level was similar to that of 2003 and fourth highest
- S49 salinity level was similar to that of 2003 and third highest
- S42 was similar to that of 2003, and was third highest
- S21 was the fourth highest
- S97 was the fourth highest
- S35 was the fourth highest

Overall, February 2004 salinity levels were ranked fourth in past 9 years in terms of high Specific Conductance.

Table 1**Monthly Mean High Tide Specific Conductance at Suisun Marsh
Water Quality Compliance Stations****February 2004**

Station	Specific Conductance (mS/cm)*	Standard	Standard meet?
C-2**	0.3	8.0	Yes
S-64	1.0	8.0	Yes
S-49	2.8	8.0	Yes
S-42	3.3***	8.0	Yes
S-21	2.1	8.0	Yes

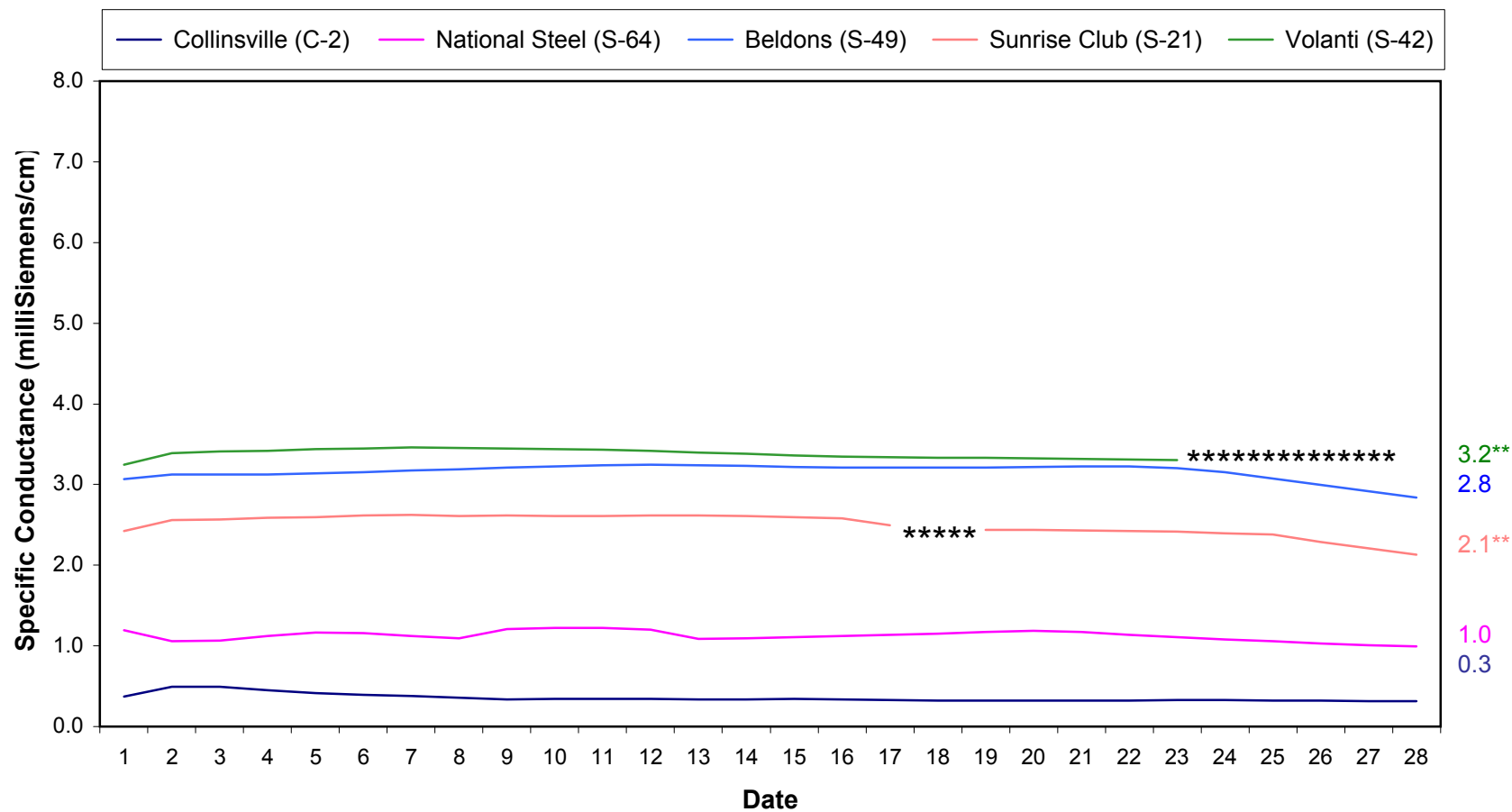
*milliSiemens per centimeter

**The representative data from nearby USBR station is used in lieu of data from station C-2.

***This value was calculated based on available data from February 1 through 23, 2004. The remaining data series from February 24 through 29, 2004 was not available due to equipment failure.

**Figure 1. Suisun Marsh Progressive Mean High Tide Specific Conductance
February 2004**

Standard = 8.0 mS/cm



* = monthly mean specific electrical conductance at high tide in milliSiemens/cm.

** = Data missing at S42 and S21 due to equipment problems.

**Figure 2. Suisun Marsh Progressive Mean High Tide Specific Conductance
February 2004**

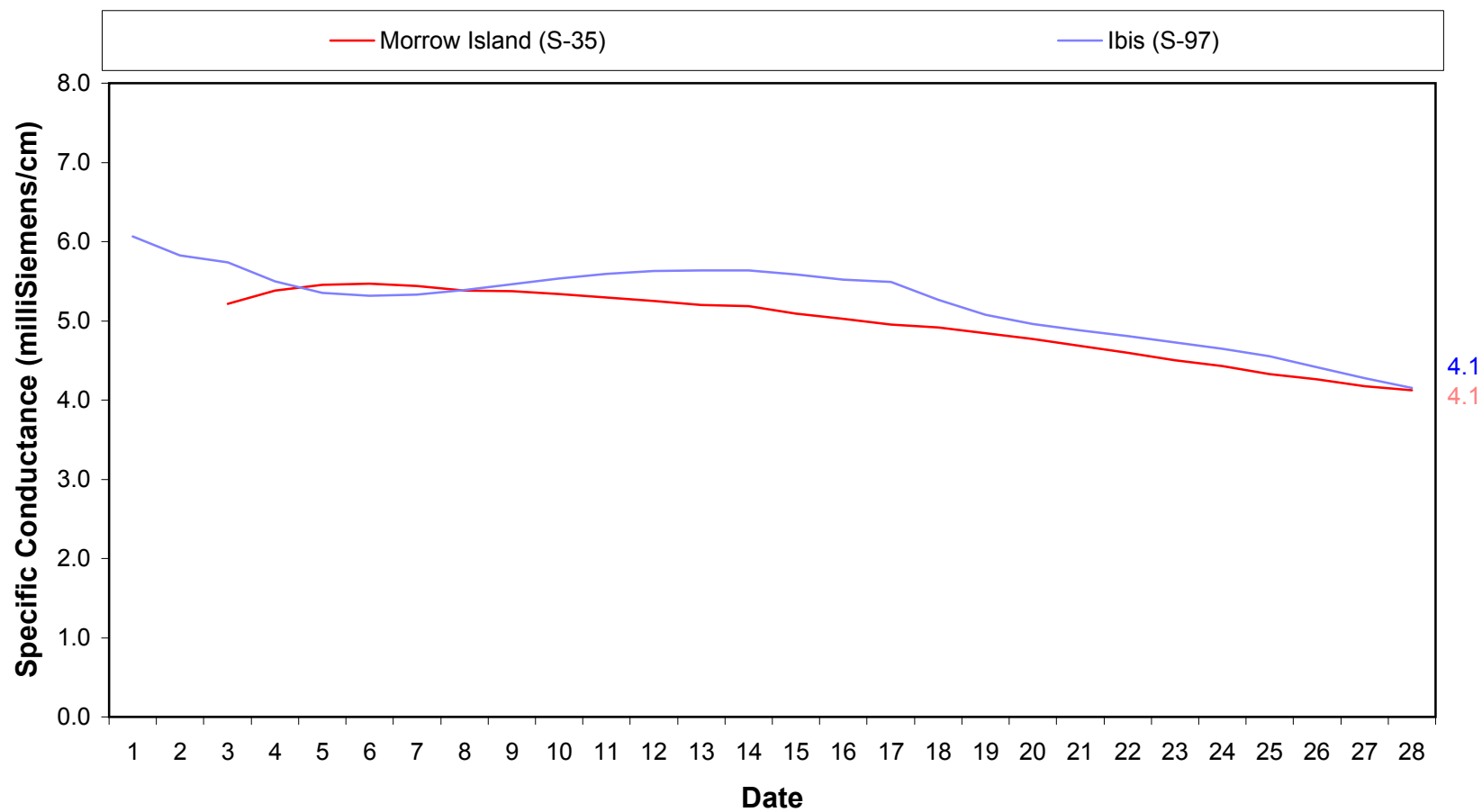
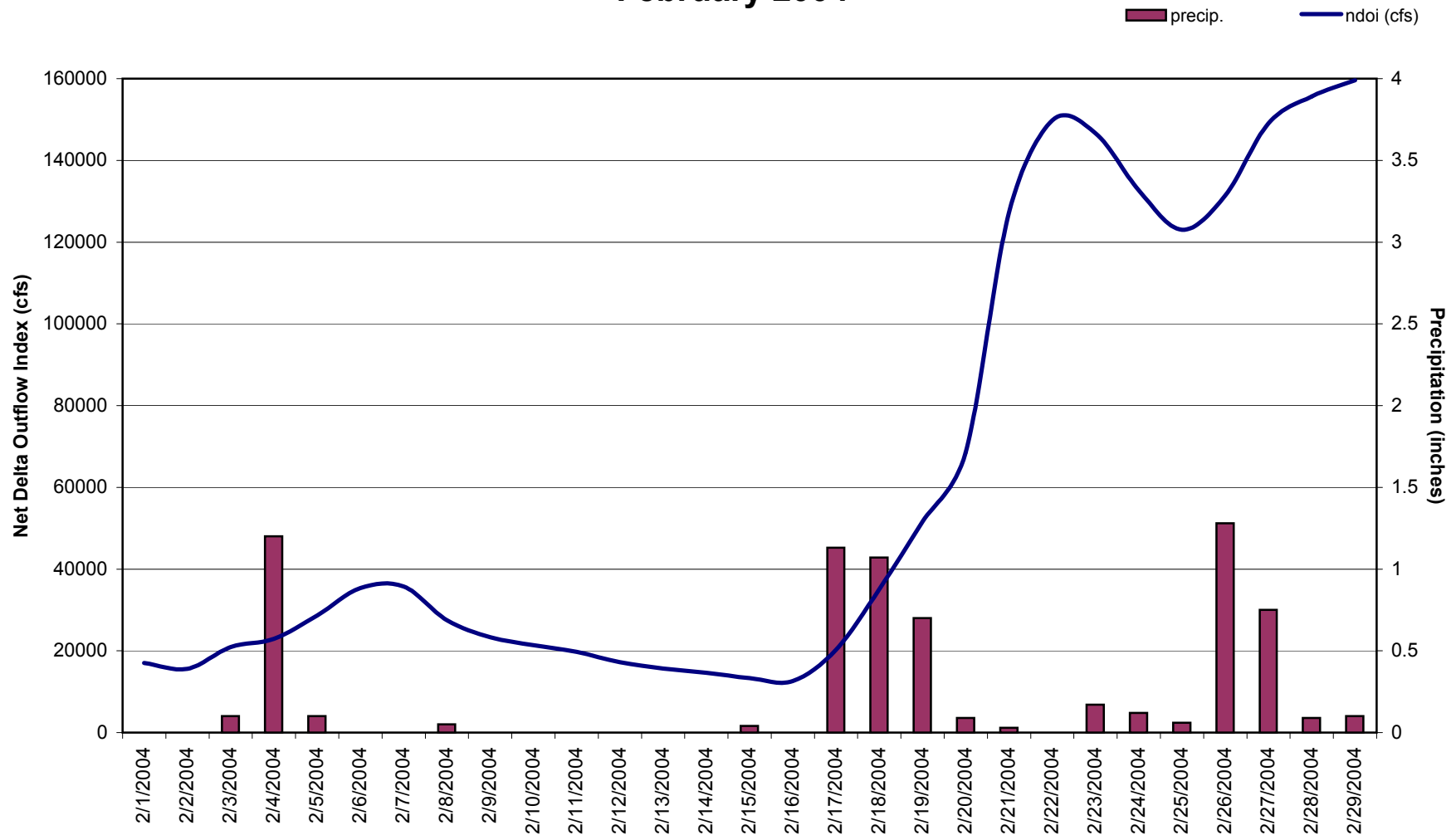
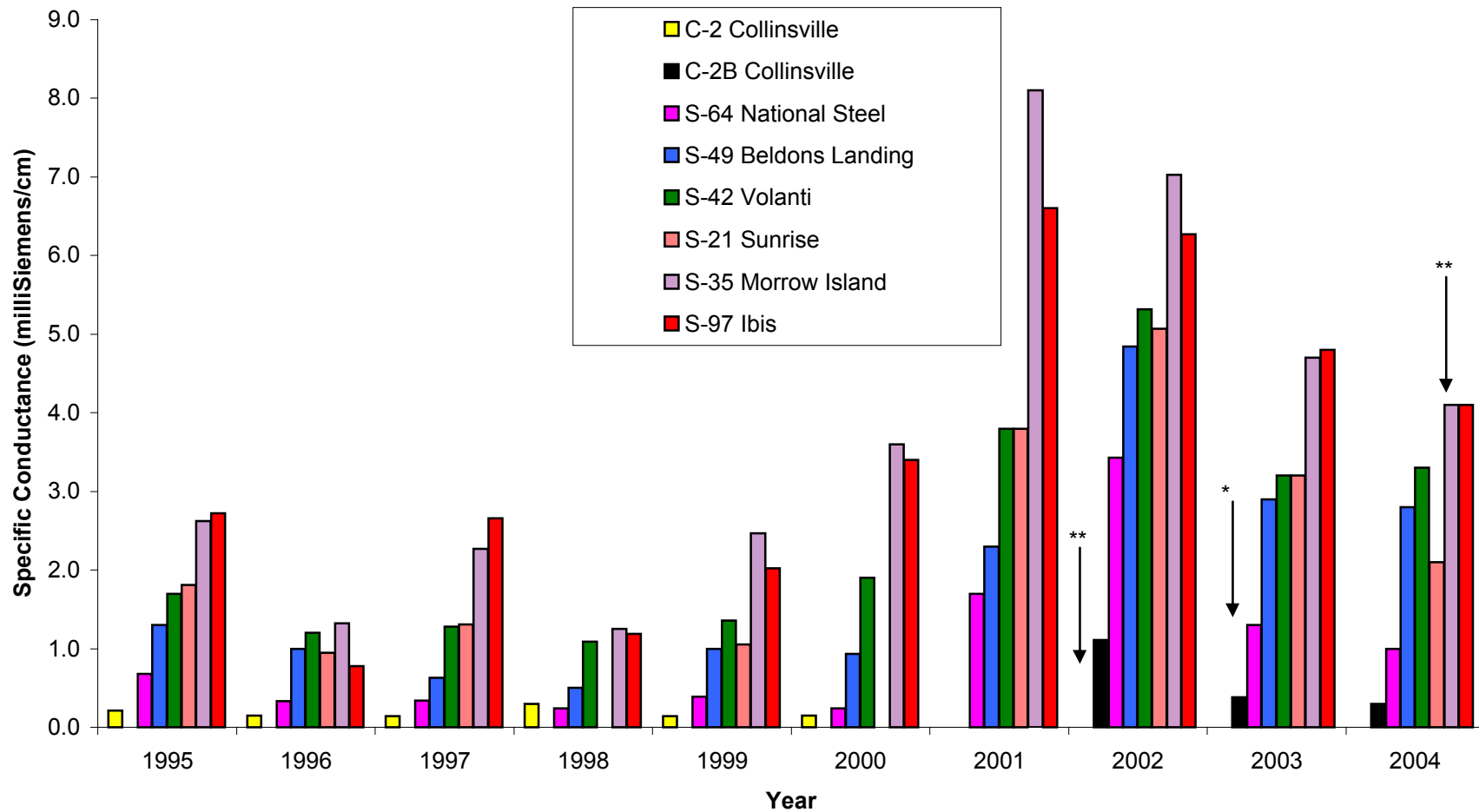


Figure 3. Daily Net Delta Outflow Index and Precipitation*
February 2004



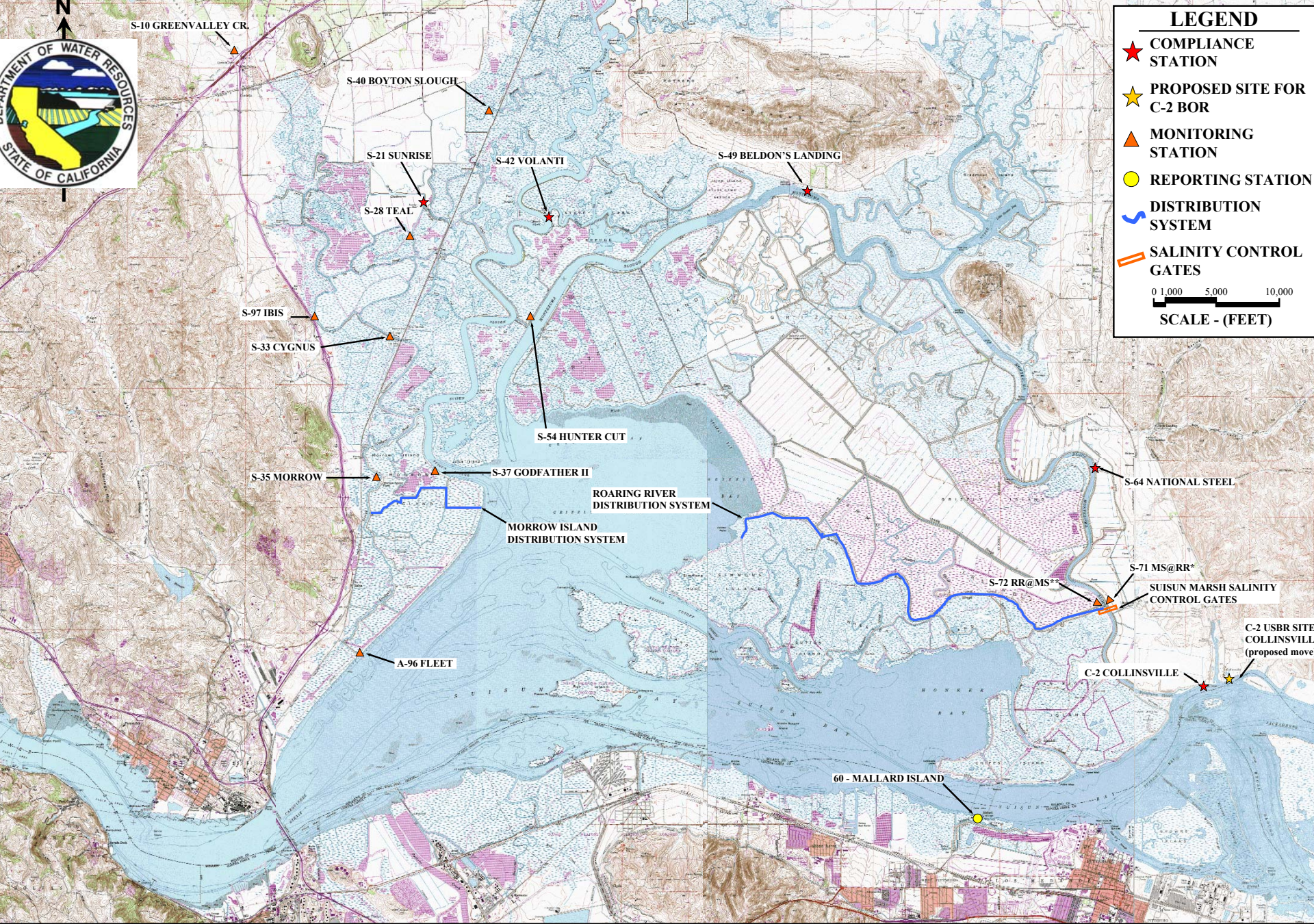
*Preliminary DWR, O&M Delta Outflow data and precipitation from Fairfield Water Treatment Plant.

**Figure 4. Monthly Mean Specific Conductance at High Tide:
Comparison of Monthly Values for Selected Stations
February of 1995-2004**



*Representative data from nearby USBR station is used in lieu of station C-2 from 2002 and thereafter.

**Data missing due to equipment failure. Number of missing data is small enough not to alter end of month value.



SUISUN MARSH PROGRAM WATER QUALITY MONITORING AND CONTROL FACILITIES